

Appl. No. : 10/719,909
Filed : November 21, 2003

AMENDMENTS TO THE CLAIMS

Claims 1-12 were pending prior to the entry of the amendments herein. Please amend Claim 1. Please add new Claims 23-41.

1. (Currently Amended) A process for electrochemically removing overburden conductive material formed over cavities having cavity conductive material therein on a surface of a workpiece, comprising the steps:

contacting the overburden conductive material with a remover including a porous conductive member insulatively coupled to an electrode, the remover being smaller in area than the workpiece;

applying a voltage between the porous conductive member and the electrode;
[[and]]

establishing relative motion between the workpiece and the ~~porous conductive member insulatively coupled to the electrode~~ remover; and

electrochemically removing the overburden conductive material on the surface of the workpiece while establishing relative motion.

2. (Original) The process of claim 1, wherein the step of contacting includes contacting less than 10% of an area of the workpiece surface.

3. (Original) The process of claim 1 further comprising maintaining a gap between the electrode and the porous conductive member.

4. (Original) The process of claim 3 further comprising bridging the gap between the electrode and the porous conductive member.

5. (Original) The process of claim 3, wherein the gap is in the range of 0.1 to 5 millimeters.

6. (Original) The process of claim 1, wherein the step of contacting the overburden conductive material includes laying an area of the porous conductive member on the overburden conductive material.

7. (Original) The process of claim 1, wherein the step of establishing relative motion includes sweeping the porous conductive member across the overburden conductive material.

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8. (Original) The process of claim 1, wherein the step of establishing relative motion includes sweeping the porous conductive member across substantially an entire surface of the workpiece.

9. (Original) The process of claim 1, wherein the step of establishing relative motion includes moving the surface of the overburden conductive material to sweep the porous conductive member across the overburden conductive material.

10. (Currently Amended) A process for electrochemically removing overburden conductive material formed over cavities having cavity conductive material therein on a surface of a workpiece comprising the steps:

contacting the overburden conductive material with a porous conductive member insulatively coupled to an electrode;

applying a voltage between the porous conductive member and the electrode;
[[and]]

establishing relative motion between the porous conductive member insulatively coupled to the electrode and the workpiece to electrochemically remove the overburden conductive material on the surface of the workpiece; and

self-limiting the electrochemical removal of the overburden conductive material after exposing the cavity conductive material.

11. (Original) The process of claim 10, wherein the step of self-limiting includes contacting the porous conductive member with an underlying barrier layer.

12. (Original) The process of claim 11, wherein the step of self-limiting includes sensing a reduced current drop between the porous conductive member and the electrode.

13.-22. (Canceled)

23. (New) The process of claim 1, wherein the porous conductive member comprises a conductive brush.

24. (New) The process of claim 1, wherein the step of contacting includes flexing the porous conductive member towards the electrode to define a gap therebetween.

25. (New) The process of claim 1, wherein the step of electrochemically removing overburden conductive material is localized to the area of the remover.

26. (New) The process of claim 24, wherein the step of removing comprises controlling a removal rate by adjusting the gap.

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27. (New) The process of claim 24, wherein the gap is between about 2 and 20 millimeters.

28. (New) The process of claim 1, wherein the step of establishing relative motion includes sweeping the porous conductive member across selected areas of the workpiece.

29. (New) The process of claim 1, wherein the voltage is less than about 20 volts.

30. (New) The process of claim 1, wherein the voltage is less than about 5 volts.

31. (New) The process of claim 1, further comprising providing a process solution between the porous conductive member and the electrode.

32. (New) The process of Claim 31, wherein the porous conductive member comprises conductive material that does not chemically react with the process solution.

33. (New) The process of claim 32, wherein the conductive material that does not chemically react with the process solution comprises at least one of platinum, iridium, palladium, alloys thereof, and polymers.

34. (New) The process of Claim 31, wherein the porous conductive member comprises conductive material that chemically reacts with the process solution.

35. (New) The process of claim 34, wherein the conductive material that chemically reacts with the process solution comprises the same material as the overburden conductive material.

36. (New) The process of claim 35, wherein the step of removing includes etching the porous conductive material and the overburden conductive material.

37. (New) The process of claim 34, wherein the conductive material that chemically reacts with the process solution comprises copper.

38. (New) The process of claim 23, wherein the conductive brush comprises a plurality of multiple flexible conductive elements.

39. (New) The process of claim 38, wherein the plurality of flexible conductive elements is flexible in a macro scale and rigid in a micro scale.

40. (New) The process of claim 38, wherein the step of contacting comprises positioning the plurality of flexible conductive elements on the workpiece such that a portion of the porous conductive material contacts the overburden conductive material.

41. (New) The process of claim 40, wherein the portion comprises more than about half the length of the flexible conductive elements.